

DISTRIBUTION AND HABITAT OF THE BLUE DUCK,
HYMENOLAIMUS MALACORHYNCHOS, IN THE SOUTH ISLAND,
NEW ZEALAND

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ABSTRACT

The South Island distribution of the New Zealand blue duck, *Hymenolaimus malacorhynchos*, is mapped and its habitat is defined. The blue duck occurs predominantly in hill country, where it lives in degraded (eroding) streams.

INTRODUCTION

New Zealand's endemic blue duck, *Hymenolaimus malacorhynchos* (Gmelin, 1789), is an unusual anatid which differs in morphology and behaviour from many other ducks (see for example, Potts 1870, Douglas in Pascoe 1957, Pengelly and Kear 1970, Kear and Burton 1971, and Kear and Steel 1971). A preliminary survey of the South Island distribution of the blue duck (Fordyce and Tunnickcliffe 1973) suggested that its distribution and habitat is markedly different from those of other New Zealand ducks. The present paper, which formed the basis for an unpublished B.Sc.(Hons) project, presents further data which allow both the distribution pattern and habitat of the blue duck in the South Island to be more accurately defined.

METHODS

Records of blue duck distribution were compiled predominantly from personal communications and sightings abstracted from literature. Some data, particularly those relating to distribution in early European times, were obtained from information provided by museum collections.

The data collected included the following information: observer, date, time of day, locality, grid reference on N.Z.M.S. (New Zealand Mapping Service), 1 yard-based grid maps (metric maps not available), details of habitat, number of ducks, sex of ducks, and observed behaviour. Over 500 records were used to compile the distribution map (Fig. 1), on which 10 000 yard grid squares from which blue duck were recorded are marked. In order to determine possible changes in blue duck distribution within the last 50 years, three sighting categories were plotted: before 1930, after 1930, before and after 1930. The date 1930 was chosen as, by this time, human interference, particularly predation and bush clearance, with blue duck populations was relatively low. This meant that populations could then stabilise, and that any trends in the change of range size in the last 50 years could be determined. A brief review of man's influence on blue duck distribution was given by Fordyce and Tunnickcliffe (1973).

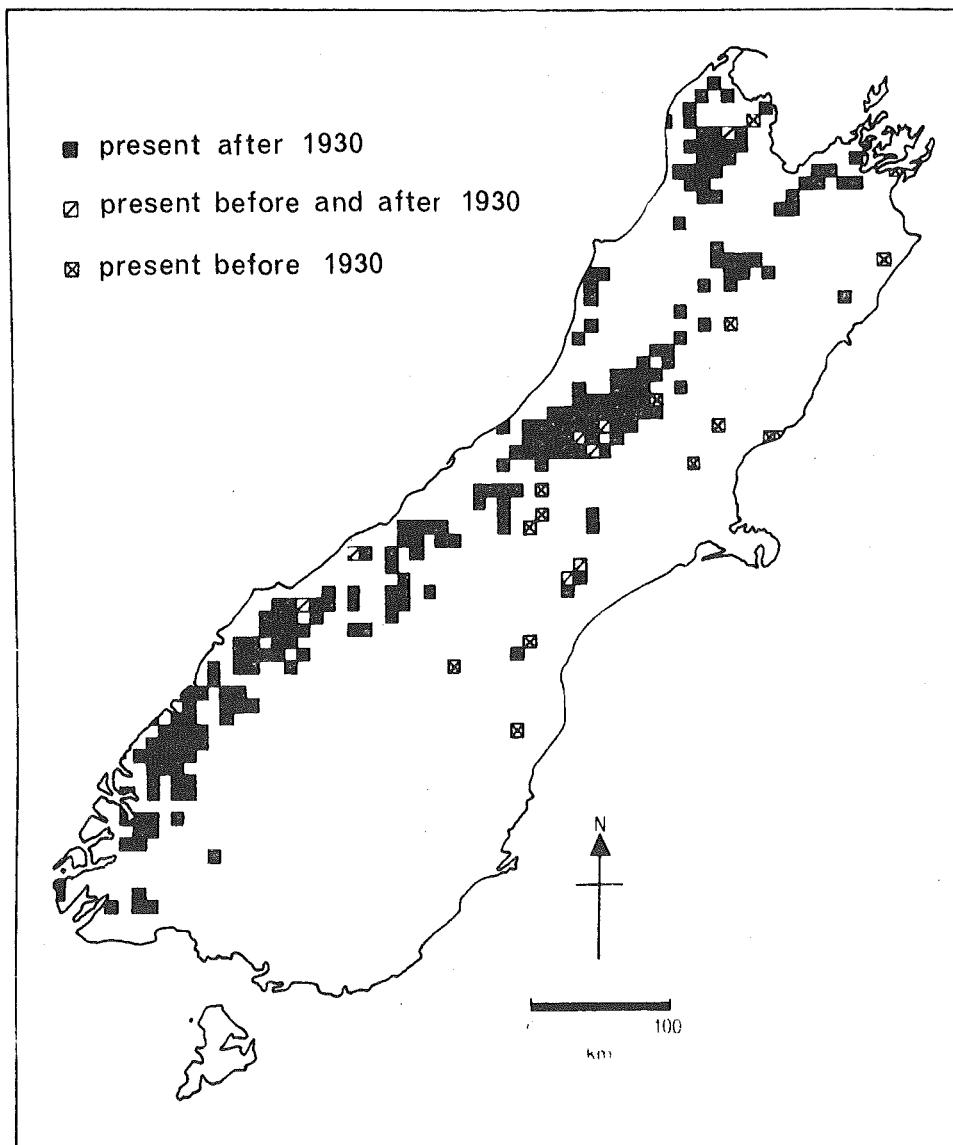


Fig 1. Distribution of the blue duck in the South Island, New Zealand, before and after 1930. Squares represent the 10 000 yard grid squares of the N.Z.M.S. 1 maps.

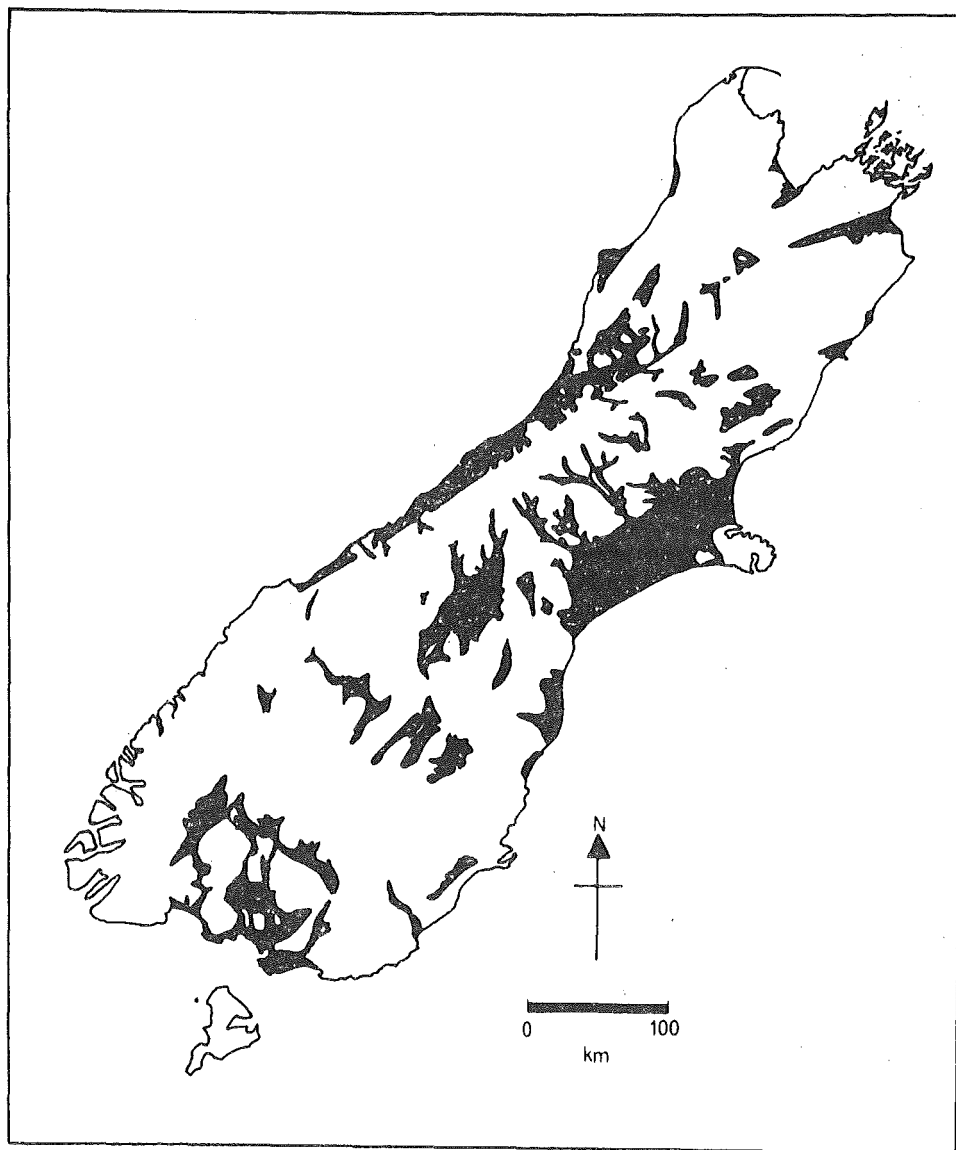


Fig. 2. Distribution of recent alluvium in the South Island, New Zealand, based on Grindley *et al.* 1961. Alluvial deposits, characteristic of aggraded streams, are coloured black.

DISTRIBUTION

Data presented in Fig. 1 show that blue duck are relatively widespread throughout the hill country of the South Island. A brief outline of provincial patterns of distribution follows:

1. Nelson: common in the interior Tasman Mountains and rugged north-western country. May occur sporadically in Pikikiruna Range; fossil evidence suggests past abundance here (Canterbury Museum data). Probably once widespread throughout low-lying areas of Golden Bay, where it still occurs occasionally. No records from Moutere Plains. Occurs in hill country south-east of Nelson City.
2. Marlborough: fairly common in mountain country west of Wairau River and in Marlborough Sounds. May have previously occurred in low eastern foothills similar in topography to areas in Canterbury where blue duck once occurred. Probably abundant in past (Handly 1895) and present in the Kaikoura Ranges.
3. Canterbury: before 1930, quite abundant in many of the eastern foothills; probably extended to sea in north- and south-Canterbury foothills. No records from Banks Peninsula, Lake Ellesmere (Tunnickliffe 1973) or flat alluvial Canterbury Plains. Now occur occasionally in Rakaia foothills (N. Fowke, pers. comm. 1973), Geraldine foothills, and Hunters Hills (M. Polglaze, pers. comm. 1974). Absent from many inland hill-country areas of north Canterbury (field surveys, 1972-1974, R.E. Fordyce). Common in Southern Alps close to the main divide.
4. Otago: occurred almost down to sea-level in some north-eastern foothills, for example, around the Waitaki River, which resemble areas in Canterbury where they occurred (data from Canterbury Museum). Now very rare or absent in eastern Otago (K. Westerskov, pers. comm. 1974). Apparently common in river valleys near main divide.
5. Southland: no past or present records from eastern areas. Foothill areas, as in Otago, may have provided suitable habitats in the past. Still present in Takitimu Mountains and possibly other western hill country.
6. Westland: there has been little apparent change in distribution here since prehistoric times. Distribution contracted noticeably in the 1880-1890s (Douglas, in Pascoe 1957). Apparently abundant in river headwaters towards main divide, and often (in the south) occur near sea level.
7. Fiordland: abundant probably throughout, in past and present, from sea-level to valley headwaters.
8. Stewart Island: no data.

The early, pre-1930 records (e.g. sightings made in the 1890s, E. Roberts, pers. comm. 1972) indicate that blue duck were once more widespread than they are now. This is also revealed by records which indicate that blue duck were abundant enough in some areas to be used as food by early settlers (Buller 1877, Douglas, in Pascoe 1957). These findings verify those of the preliminary survey made by Fordyce and Tunnickliffe (1973).

Altitudinal pattern of distribution

The data used here allow the altitudinal range of the blue duck to be more accurately defined than by Fordyce and Tunncliffe (1973). Although the blue duck is primarily a freshwater bird, it may occur at sea-level. Blue duck have often been seen on beaches or swimming on the sea in Fiordland (Buller 1888, J. Clark, pers. comm. 1974), and have been observed "about 1 mile from the sea" in Boundary Gully, Motunau, Canterbury, about 1893 (E. Roberts, pers. comm. 1972). Apparently, however, they are not physiologically adapted to living in a saltwater environment, for their skulls show no evidence of well-developed supra-orbital salt glands characteristic of marine birds. Upper altitude limits are probably determined by the presence of permanent snow or ice, for example, in proximity to glaciers (Potts 1870), P. Croft, pers. comm. 1974). The usual altitude range is between 450 m and 1350 m, which correlates with the occurrence of suitable habitats (see Habitat).

HABITAT

When the distribution map (Fig. 1) was being assembled, it became apparent that areas in which blue duck had never been recorded coincided with the areas mapped by Grindley *et al.* (1961) as recent alluvial deposits (Fig. 2). These deposits comprise sediments such as outwash terraces, swamps, dunes, fans, and moraines. A close study of the distribution map and Fig. 2 verified this observation: blue duck have not been recorded in areas where alluvial deposits are abundant but are known from areas where significant alluvial deposits are absent.

The type of stream or river that occurs in alluvium-free areas may be defined as a degraded stream. Conversely, streams and rivers in areas of significant alluvial deposits are generally aggraded streams. The differences between these two types of streams are summarised in Table 1, which is based on field observations.

TABLE 1. A COMPARISON OF THE CHARACTERISTICS OF AGGRADED AND DEGRADED STREAMS.

Character	Aggraded streams	Degraded streams
Profile	shallow	steep
Physiography	plains, with meandering rivers and streams	mountainous, hilly, with gorgy streams
Sediment sizes	generally fine	generally coarse
Sediment sorting	well sorted; little variation in sizes present	poorly sorted; considerable variation in sizes
Water velocity	slow	fast

That this habitat is preferred was further verified by my personal field observations, which show that blue duck occur in fast-flowing degraded streams, with a width of 2 m to over 20 m (e.g. the Waimakariri River headwaters, Canterbury), characteristically in rugged hill country between 450 m and 1350 m above sea level. These often-gorged streams may contain stretches of rapid-flowing water and waterfalls or rapids, which may alternate with pools commonly 5 m to 15 m long. Here the water flows more slowly, and sediments are finer. The gorges of degraded streams are often quite narrow (20 m to 40 m wide) and water may often fill up to half their width. Interspersed between the gorges, of which there may be several in river headwaters, there may be large stretches of open river bed 50 m to several hundred metres wide. Blue duck also utilise small, steep streams that flow out onto plains or into the sea without any pronounced gorges or stretches of open riverbed. It is common to see blue duck flying and swimming through the gorges of degraded streams and rivers. Here, they often forage in rapids and around the edges of slower, flowing pools in gorges, and occasionally in pools in open, aggraded riverbed above and below these gorges. They often withdraw to less turbulent waters, in or just out of gorges, to preen and rest; hence there may be a locus of activity around these areas (e.g. by Lake Kaurapataka, Oteha River, North Westland).

While a degraded stream is a necessary feature of typical blue duck habitat, it is certain that factors such as the occurrence of food (freshwater insects Kear and Burton 1971, and my unpublished data) and suitable vegetation for shelter are also important. The absence of blue duck in areas where degraded streams occur but where vegetation around streams is scarce, for example, in Central Otago, emphasises this point. However, since the aim of this section is to define the type of habitat suitable for blue duck rather than to determine why the habitat is suitable, the influence of vegetation and food is not further discussed.

My conclusion from this study is that the distribution of the blue duck is limited by its restricted habitat, a degraded stream.

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